WHAT IS CLAIMED IS:

1. A bio-sensor system adapted to provide a substantially stable voltage to a sensor assembly that is implantable in a patient such that physiological parameters thereof may be accurately measured, the bio-sensor system comprising:

a remote transponder configured to transmit a scanner signal to the sensor and to receive a data signal therefrom;

an implantable on-chip transponder in wireless communication with the remote transponder and being configured to receive the scanner signal and transmit the data signal, the on-chip transponder including:

a sensor being configured to generate a sensor signal representative of the physiological parameter of the patient;

a power receiver configured to receive the scanner signal from the remote transponder and to generate a power signal for powering the on-chip transponder;

an analog-to-digital (A/D) assembly connected to the power receiver and the sensor, the A/D assembly being configured to respectively receive the power signal and the sensor signal and generate a digital signal in response thereto;

a data processor connected to the A/D assembly and the power receiver, the data processor being configured to respectively receive the power

signal and the digital signal and generate a data signal in response thereto; and

an RF transmitter connected to the power receiver and the data processor and being configured to respectively receive the power signal and the data signal and to modulate, amplify, filter and transmit the data signal;

wherein the power receiver is configured to supply a substantially non-deviating sensor reference voltage to the sensor for accurate measurement of the physiological parameter, the remote transponder being configured to receive the data signal from the RF transmitter and to extract data representative of the physiological parameter.

2. The bio-sensor system of Claim 1 wherein:

the sensor is a glucose sensor having an electrode assembly in fluid communication with the patient's blood and being configured to measure a glucose level thereof;

the sensor reference voltage being supplied to the electrode assembly at a substantially constant value of about positive 0.7 volts.

3. The bio-sensor system of Claim 2 wherein the glucose sensor is a 2-pin glucose sensor with the electrode assembly having first and second terminals in fluid communication with the patient's blood, the glucose sensor further including:

a first precision resistor connected to the power receiver and configured to receive the sensor

reference voltage therefrom for excitation of the glucose sensor;

a first operational amplifier connected to the first precision resistor and being configured to receive the sensor reference voltage therefrom and generate a precision sensor reference voltage in response thereto;

a voltmeter connected to the first operational amplifier and the first precision resistor and being configured to monitor the precision sensor reference voltage and establish a sensor operating point, the first operational amplifier and the voltmeter cooperating to buffer the precision sensor reference voltage and apply a substantially accurate sensor reference voltage to the first terminal;

a second operational amplifier connected to the second terminal and being configured to receive current discharging therefrom in response to the accurate sensor reference voltage applied to the first terminal; and

a tunable second precision resistor connected to the second operational amplifier and cooperating therewith to generate a sensor signal that is substantially proportional to the glucose level of the patient's blood.

4. The bio-sensor system of Claim 3 wherein the glucose sensor is a 3-pin glucose sensor with the electrode assembly further including a third terminal co-located with the first and second terminals and being in fluid communication with the patient's blood, the glucose sensor further including:

an auxiliary control circuit connected between the third electrode and the second operational amplifier and being configured to monitor and control an amount of current discharging from the third terminal;

wherein the third terminal is configured to divert current away from the second electrode during application of the accurate sensor reference voltage applied to the first terminal such that the operational life of the glucose sensor may be increased.

5. A bio-sensor system adapted to provide a substantially stable voltage to a sensor assembly that is implantable in a patient such that physiological parameters thereof may be accurately measured, the bio-sensor system comprising:

a remote transponder configured to transmit a scanner signal to the sensor and to receive a data signal therefrom;

an implantable on-chip transponder in wireless communication with the remote transponder and being configured to receive the scanner signal and transmit the data signal, the on-chip transponder including:

a sensor being configured to generate a sensor signal representative of the physiological parameter of the patient;

a radio frequency (RF) receiver configured to receive the scanner signal from the remote transponder and to filter, amplify and demodulate

the scanner signal and generate a message signal for controlling the on-chip transponder;

a power receiver configured to receive the scanner signal from the remote transponder and to generate a power signal for powering the on-chip transponder;

an analog-to-digital (A/D) assembly connected to the power receiver, the RF receiver and the sensor, the A/D assembly being configured to respectively receive the power signal, the sensor signal and the message signal and generate a digital signal in response thereto;

a data processor connected to the A/D assembly, the power receiver and the RF receiver, the data processor being configured to respectively receive the power signal, the digital signal and the message signal and generate a data signal in response thereto; and

an RF transmitter connected to the power receiver, the data processor and the RF receiver and being configured to respectively receive the power signal, the data signal and the message signal and to modulate, amplify, filter and transmit the data signal;

wherein the power receiver is configured to supply a substantially non-deviating sensor reference voltage to the sensor for accurate measurement of the physiological

parameter, the remote transponder being configured to receive the data signal from the RF transmitter and to extract data representative of the physiological parameter.

6. The bio-sensor system of Claim 5 wherein:

the sensor is a glucose sensor having an electrode assembly in fluid communication with the patient's blood and being configured to measure a glucose level thereof;

the sensor reference voltage being supplied to the electrode assembly at a substantially constant value of about positive 0.7 volts.

7. The bio-sensor system of Claim 6 wherein the glucose sensor is a 2-pin glucose sensor with the electrode assembly having first and second terminals in fluid communication with the patient's blood, the glucose sensor further including:

a first precision resistor connected to the power receiver and configured to receive the sensor reference voltage therefrom for excitation of the glucose sensor;

a first operational amplifier connected to the first precision resistor and being configured to receive the sensor reference voltage therefrom and generate a precision sensor reference voltage in response thereto;

a voltmeter connected to the first operational amplifier and the first precision resistor and being configured to monitor the precision sensor reference voltage and establish a sensor operating point, the first operational amplifier and the voltmeter cooperating to buffer the precision sensor reference voltage and apply a substantially accurate sensor reference voltage to the first terminal;

a second operational amplifier connected to the second terminal and being configured to receive current discharging therefrom in response to the accurate sensor reference voltage applied to the first terminal; and

a tunable second precision resistor connected to the second operational amplifier and cooperating therewith to generate a sensor signal that is substantially proportional to the glucose level of the patient's blood.

8. The bio-sensor system of Claim 7 wherein the glucose sensor is a 3-pin glucose sensor with the electrode assembly further including a third terminal co-located with the first and second terminals and being in fluid communication with the patient's blood, the glucose sensor further including:

an auxiliary control circuit connected between the third electrode and the second operational amplifier and being configured to monitor and control an amount of current discharging from the third terminal;

wherein the third terminal is configured to divert current away from the second electrode during application of the accurate sensor reference voltage applied to the first terminal such that the operational life of the glucose sensor may be increased.

9. The bio-sensor system of Claim 5 further including a plurality of sensors, each one of the sensors being operative to sense a distinct physiological parameter of the patient and generate a sensor signal representative thereof.

10. The bio-sensor system of Claim 9 wherein the RF receiver is configured to coordinate requests for data from one or more of the sensors for subsequent transmission of the data to the remote transponder.

11. The bio-sensor system of Claim 10 wherein the wherein the data processor is configured to assign a preset identification code to the digital signal for identifying the sensor from which the sensor signal originates.

12. The bio-sensor system of Claim 5 wherein the A/D assembly includes:

a processor-filter connected to the bio-sensor and being configured to receive the sensor signal therefrom and generate a filtered signal in response thereto;

an amplifier connected to the processor-filter and being configured to receive the filtered signal therefrom and generate an amplified signal in response thereto;

a voltage comparator connected to the power receiver and being configured to receive the power signal therefrom and generate a normalized voltage signal in response thereto;

an A/D converter connected to the amplifier and the voltage comparator and being configured to receive respective ones of the amplified signal and the normalized voltage signal therefrom and generate a converter signal in response thereto;

a covert logic device connected to the A/D converter and being configured to receive the converter signal therefrom and generate a logic signal in response thereto; and

a controller in two-way communication with the RF receiver and being connected to the covert logic device, the controller being configured to receive the message signal and the logic signal and to synchronize the A/D converter with the data processor for subsequent generation of the digital signal in response to the message signal and the logic signal.

13. The bio-sensor system of Claim 12 further including:

a plurality of sensors, each one of the sensors being operative to sense a distinct physiological parameter of the patient and generate a sensor signal representative thereof;

wherein the A/D assembly further includes a switch connected to the controller with the controller being responsive to the message signal and being operative to cause the switch to select among sensor signals for subsequent transmission thereof to the processor filter.

14. The bio-sensor system of Claim 13 wherein the data processor includes:

a signal filter connected to the A/D assembly and being configured to receive the digitized signal therefrom, remove unwanted noise and generate a filtered signal in response thereto;

an amplifier connected to the signal filter and being configured to receive the filtered signal and generate an amplified signal in response thereto;

a program counter connected to the RF receiver and the power receiver and being configured to receive respective ones of the message signal and the power signal therefrom and generate a gated signal in response thereto;

an interrupt request device connected to the program counter and being configured to receive the gated signal therefrom and generate an interrupt request signal in response thereto;

a calculator connected to the signal filter, the amplifier and the interrupt request device and being configured to receive respective ones of the filtered signal, the amplified signal and the gated signal therefrom and generate an encoded signal in response thereto; and

a digital filter connected to the calculator and being configured to receive the encoded signal therefrom and generate the data signal in response thereto.

15. The bio-sensor system of Claim 5 wherein the RF transmitter includes:

a data input filter connected to the data processor and being configured to receive the data signal therefrom to filter out high-frequency spectral components and generate a filtered data signal in response thereto;

a modulator connected to the power receiver, the RF receiver and the data input filter and being configured to receive respective ones of the message signal, the power signal and the filtered data signal therefrom and to pulse code modulate the filtered data signal by varying amplitude thereof and generating a first and second modulated signal in response thereto;

a first transmitter amplifier connected to the modulator and being configured to receive the first modulated signal therefrom;

a transmitter filter cooperating with the first transmitter amplifier to create a first amplified signal at a desired frequency of radio transmission;

a second transmitter amplifier connected to the modulator and the first transmitter and being configured to receive respective ones of the second modulated signal and the first amplified signal therefrom and generate a second amplified signal having a desired power level for transmission to the remote transponder;

a surface acoustic wave (SAW) filter connected to the second transmitter amplifier and being configured to receive the second amplified signal and remove unwanted harmonics therefrom and generate a transmitted signal in response thereto; and

a RF transmitter antenna connected to the SAW filter and being configured to radiate the transmitted signal for receipt by the receiving antenna of the remote transponder.

16. The bio-sensor system of Claim 5 wherein the power receiver includes:

a syntonic oscillator connected to the RF receiver antenna and being configured to receive the scanner signal therefrom and generate an alternating current (AC) voltage signal in response thereto;

a rectifier connected to the syntonic oscillator and being configured to receive the AC voltage signal therefrom and generate a generally coarse direct current (DC) voltage signal in response thereto;

a filter connected to the rectifier and being configured to receive the direct voltage signal therefrom, the filter having a capacitor configured to store energy from cycles of the generally coarse DC voltage signal for release as a substantially smooth DC voltage signal;

a first regulator connected to the filter and being configured to receive the DC voltage signal therefrom and generate a first voltage signal to power the A/D assembly, the data processor and the RF transmitter;

a second regulator connected to the filter and being configured to receive the DC voltage signal therefrom and generate a second voltage signal to power the A/D assembly, the data processor and the RF transmitter; and

a sensor reference supply connected to the filter and being configured to receive the DC voltage signal therefrom and

generate a sensor reference voltage signal to power the sensor assembly.

17. The bio-sensor system of Claim 5 wherein the RF receiver includes:

an RF receiver antenna configured to receive the scanner signal from the remote transponder;

a surface acoustic wave (SAW) filter connected to the RF receiver antenna and being configured to receive the scanner signal therefrom and filter the scanner signal of unwanted signals and generate a filtered scanner signal in response thereto;

a first RF amplifier connected to the SAW filter and being configured to receive the filtered scanner signal therefrom and generate a first amplified scanner signal in response thereto;

a SAW delay connected to the first RF amplifier and configured to receive the first amplified scanner signal therefrom and generate a compared signal;

a second RF amplifier connected to the SAW delay and being configured to receive the compared signal therefrom;

a pulse generator connected in parallel to the SAW delay at the first and second RF amplifiers and cooperating therewith to generate first and second pulse signals for receipt by respective ones of the first and second RF amplifiers such that the second RF amplifier generates a second amplified RF signal; and

a detector-filter connected to the second RF amplifier and being configured to receive the second amplified RF signal therefrom and generate the message signal.

18. The bio-sensor system of Claim 5 wherein the remote transponder includes:

an oscillator configured to generate an analog signal at a predetermined frequency;

an encoder connected to the oscillator and configured to receive and modulate the analog signal and generate an encoded signal in response thereto;

a power transmitter connected to the encoder and configured to receive and amplify the encoded signal and generate the scanner signal; and

a transmitting antenna connected to the power transmitter and configured to receive the scanner signal therefrom for radio transmission to the on-chip transponder.

19. The bio-sensor system of Claim 18 wherein the remote transponder further includes:

a receiving antenna configured to receive the data signal from the RF transmitter;

a surface acoustic wave (SAW) filter connected to the receiving antenna and being configured to receive and filter the data signal of unwanted signals that may

interfere with the remote transponder and generate a filtered data signal in response thereto;

a first RF amplifier connected to the SAW filter and being configured to receive the filtered data signal therefrom and generate a first amplified data signal in response thereto;

a SAW delay connected to the first RF amplifier and configured to receive the first amplified data signal therefrom and generate a compared signal;

a second RF amplifier connected to the SAW delay and being configured to receive the compared signal therefrom;

a pulse generator connected in parallel to the SAW delay at the first and second RF amplifiers and cooperating therewith to generate first and second pulse signals for receipt by respective ones of the first and second RF amplifiers such that the second RF amplifier generates a second amplified RF signal; and

a detector-filter connected to the second RF amplifier and being configured to receive the second amplified RF signal for extraction of digitized data therefrom.

20. The bio-sensor system of Claim 19 further including a decoder connected to the detector-filter and being configured to receive the second amplified RF signal for extraction of digitized data therefrom.

21. The bio-sensor system of Claim 20 further including:

a plurality of sensors, each one of the sensors being operative to sense a distinct physiological parameter of the patient and generate a sensor signal representative thereof;

wherein the decoder is configured to select one or more of the plurality of the sensors from which to receive data.

22. A method of remotely monitoring physiological parameters using a bio-sensor system comprising a remote transponder and an on-chip transponder having a sensor implantable in a patient, the method comprising the steps of:

a. remotely generating and wirelessly transmitting a scanner signal with the remote transponder, the scanner signal containing radio signal power and a telemetry data request;

b. receiving the scanner signal at the on-chip transponder and filtering, amplifying and demodulating the scanner signal to generate a message signal in response thereto;

c. collecting the radio signal power from the scanner signal and generating a power signal in response thereto;

d. sensing at least one physiological parameter of the patient at the sensor and generating an analog sensor signal in response thereto;

e. receiving the power signal, the analog sensor signal and the message signal at an analog-to-digital (A/D) assembly and generating a digital signal representative of the analog sensor signal;

f. receiving the power signal, the message signal and the digital signal at a data processor and preparing the digital signal for modulation and generating a data signal representative of the digital signal;

g. receiving the power signal, the message signal and the data signal at an RF transmitter and modulating, amplifying, filtering and wirelessly transmitting the data signal; and

h. receiving the data signal at the remote transponder and extracting data representative of the physiological parameter of the patient.

23. The method of Claim 22 wherein the sensor is a 2-pin glucose sensor having an electrode assembly with first and second terminals in fluid communication with the patient's blood for sensing a glucose level of the patient, step (d) further comprising the steps of:

tuning the power signal with a first precision resistor to generate a sensor reference voltage of about positive 0.7 volts for excitation of the glucose sensor;

receiving the sensor reference voltage at a first operational amplifier and generating a precision sensor reference voltage;

monitoring the precision sensor reference voltage with a voltmeter connected to the first operational amplifier

and the first precision resistor to establish a sensor operating point;

buffering the precision sensor reference voltage with the first operational amplifier in cooperation with the voltmeter to generate a substantially accurate sensor reference voltage;

applying the substantially accurate sensor reference voltage to the first terminal to cause current to discharge from the second terminal in response to a reaction with the patient's blood at the first and second terminals;

receiving the discharging current at a second operational amplifier, the current being proportional to the glucose level of the patient's blood; and

tuning a second precision resistor connected to the second operational amplifier to form a voltage divider with the glucose sensor;

measuring the discharging current with the second precision resistor in cooperation with the second operational amplifier; and

generating the sensor signal that is substantially proportional to the glucose level.

24. The method of Claim 23 wherein the sensor is a 3-pin glucose sensor additionally including a third terminal co-located with the first and second terminals and being in fluid communication with the patient's blood, step (d) further comprising the steps of:

diverting a portion of the current away from the second terminal by discharging current at the third terminal during application of the substantially accurate sensor reference voltage to the first terminal;

receiving the discharging current at an auxiliary control circuit connected between the third electrode and the second operational amplifier; and

monitoring and controlling an amount of current discharging from the third terminal in order to stabilize the substantially accurate sensor reference voltage applied to the first terminal and increase the operational life of the glucose sensor.